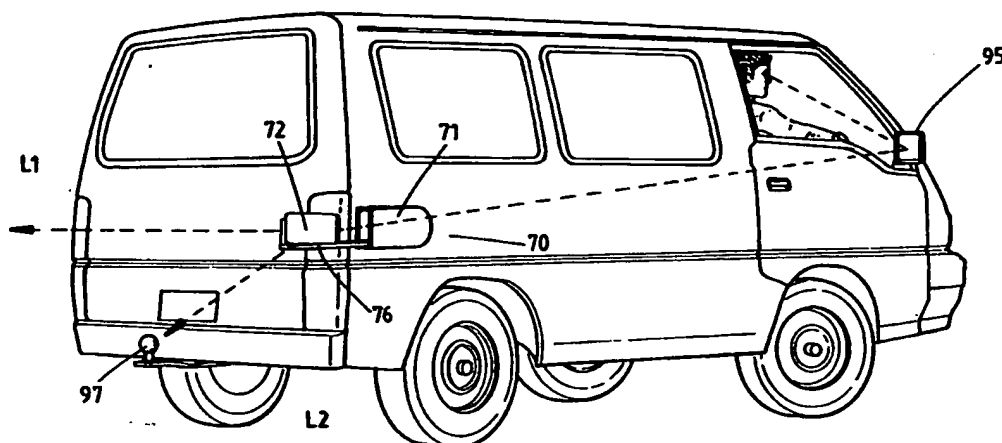




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**(54) Title:** REARVIEW MIRROR FOR RIGHT-ANGLE VIEW**(57) Abstract**

A mirror assembly attachable to a motor body near its rear end for providing a driver with a side view of oncoming traffic when backing into a carriageway, having a base (71) supporting and storing a mirror housing (72) which is adjusted for a mirror to reflect light from a side of the motor vehicle onto a conventional rear vision mirror (95) in front of the driver. Three other embodiments are also described. In the first, the mirror assembly comprises two angled mirrors to reflect light from each side of the vehicle; in the second, the mirror assembly is foldable using two uneven arms and, in the third, the mirror is storable and pivots about an axis of a post and rotates with the post between operative and stored positions.

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## **REAR VIEW MIRROR FOR RIGHT-ANGLE VIEW**

This invention relates to a mirror assembly which, when attached to a vehicle body near the rear end of a motor vehicle is suitable for providing a driver with a side view of oncoming traffic when the driver is backing away from a kerb, for example, by reflecting vision from one side of the vehicle onto a conventional rear view mirror forward of the vehicle driving station.

### **BACKGROUND OF THE INVENTION**

The inadequacy of rear vision is a matter which has been addressed previously and, for example, a reader may refer to the British Patent Application No 2235173A in the name of REEVES, wherein there is shown a deflector mirror mounted on the front bumper of a vehicle which will assist a driver in ascertaining proximity to another vehicle in front, and also a rear reflecting mirror mounted from the rear bumper bar of a vehicle to enable a driver to ascertain the proximity of a vehicle behind. The driver may also refer to the German Patent Application No 3611294 in the name of SAHLER, German Patent Application No 3718125 C1 in the name of AUDI AG, the British Application No 2172560 in the name of PAVLEDIS, the British Application No 2105667 A in the name of BROWNE, the German Patent 2707193 in the name of LEHMANN. The latter is the only application known to the Applicant wherein lateral views can be determined by means of reflectors carried on a vehicle, but those reflectors are indicated at the front of a vehicle so that a driver can ascertain the existence of traffic as he drives in a forward direction.

The main object of this invention is to provide a rear view mirror which is capable of performing at least one of the two functions of firstly making available to the driver knowledge of oncoming traffic when the driver may be backing out of a side road or from a private driveway, and secondly making the knowledge available when backing out from a kerb at which he may have angle parked his vehicle.

### **BRIEF SUMMARY OF THE INVENTION**

A mirror assembly has a mirror in a housing on a base which includes an adjustment for mirror position. The base is secured to a motor vehicle body near its rear end, and the mirror housing is adjusted to reflect light from the side of the vehicle body onto a conventional rear vision mirror, in front of a driver, so that the driver is alerted by side view to oncoming traffic when backing a vehicle onto a carriageway.

There is sometimes a vehicle body design which will include a flat or almost flat upper portion of a boot lid, or between a boot lid and rear window, and in an embodiment of the invention there is provided a rear vision mirror complex having a base of general V shape carrying mirrors which will deflect vision from both sides of the vehicle forwardly through the rear window light and onto the internal rear vision mirror of the vehicle cabin. Such a rear vision mirror assembly can be adjustable with respect to the boot lid upper surface, and may incorporate further adjustment between each mirrors and the base.

However, there are some vehicles such as panel vans and station sedans which may not always provide clear vision to the interior rear vision mirror of a cabin, and in a further embodiment, the invention may comprise a housing socket which is attachable to the side wall of the vehicle near the rear end of the vehicle, a mirror which is normally contained in a retracted position within the housing, and an extension arm which will extend the reflective surface of the mirror rearwardly beyond obstructions of the vehicle body, and at the same time angle it so that transverse vision can be obtained of traffic which is oncoming from the side of the vehicle opposite the driving station (the most dangerous traffic stream to a driver backing from a kerb).

Where it is permissible to do so, sometimes the reflective surface of a mirror can be non-planar but slightly convex and this has the advantage of increasing the arc of vision.

In yet another embodiment of the invention, a reflective mirror can be elevated from the driving station side of a vehicle near its rear end but above the boot lid of a conventional sedan type vehicle, to view the oncoming traffic from the opposite side of the vehicle, but retract back to lie contiguous with a mounting base, which can protect the reflective surface and thereby avoid the need for a socket into which the mirror retracts in the panel van or station wagon type of vehicle.

More specifically, in the invention a rear view mirror assembly is provided with a base, attachment means co-operable with a base securing the base with respect to a panel of a motor vehicle near its rear end, a mirror carried by the base, the configuration of a base, attachment means and a mirror directing the mirror (when secured to said panel) in a transverse direction opposite a driving station of the vehicle, and adjustment means on the base operable to so adjust the mirror position as to reflect light onto a

conventional rear vision mirror of said vehicle to be readable by a driver at the driving station.

### BRIEF SUMMARY OF THE DRAWINGS

Four embodiments of the invention are described hereunder in some detail with reference to and are illustrated in the accompanying drawings in which:

Fig 1 is a fragmentary rear perspective view of a sedan type vehicle having a rear vision mirror complex with a base of general V shape mounted on the boot lid;

Fig 2 is a central longitudinal section through the rear vision mirror complex of Fig 1;

Fig 3 is a plan section taken on line 3-3 of Fig 2;

Fig 4A is a diagrammatic, partially "exploded" plan section of a retractable rear vision mirror in accordance with a second embodiment, utilising links of unequal length to guide a mirror between extended and retracted positions;

Fig 4B is a diagrammatic perspective representation of the links and drive means of Fig 4A;

Fig 5 is a section taken on line 5-5 of Fig 4A, showing on line 4-4 the section on which Fig 4A is taken, and illustrating the elevational shape of the mirror assembly;

Fig 6A is an elevational section similar to Fig 5 but showing a third embodiment wherein the mirror assembly comprises a socket into which a mirror may be retracted;

Fig 6B is a fragmentary section showing a first stage of extension of the mirror;

Fig 6C is a similar view showing a second stage of extension of the mirror;

Fig 6D shows in plan view the way in which the mirror is angled as it is extended to provide the desired direction to reflect light from the side of the vehicle opposite the driving station;

Fig 7 is a fragmentary section taken on line 7-7 of Fig 6A;

Fig 8 is a diagrammatic perspective "exploded" representation showing some of the components which are illustrated in Fig 6A;

Fig 9 is a section taken on line 9-9 of Fig 6D and illustrating a mirror with two reflective surfaces to respectively reflect light on the side of the vehicle

opposite the driving station and also to reflect light from the tow ball of a vehicle;

Fig 10 is a fragmentary view showing the mirror assembly of Figs 6A to 9 mounted on a panel van type of vehicle;

Fig 11 is a side elevational view of a retractable mirror in accordance with a fourth embodiment; and

Fig 12 is a top view of Fig 11 but showing the driving mechanism in section.

#### DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

Reference is made firstly to the embodiment of Figs 1, 2 and 3, wherein a rear vision mirror complex 20 is mounted on the boot lid of a small sedan type vehicle 21 centrally, and rearwardly of the window light 22.

The rear vision mirror complex 20 is provided with a base 23 which is secured by means (not shown) to the boot lid, and a mirror housing 24 is secured to the base 23 by means of a securing bolt 25 which passes through a slot 26 in an upstanding tongue 27 of base 23. This type of adjustment enables the mirror housing 24 to be oriented through more than 90° so that the base 23 can, for example, be secured to a panel of a panel van or station wagon type of vehicle and the mirror housing 24 can be located in a depending manner rearwardly of a rear window light thereof.

The mirror complex 20 comprises two mirror assemblies 28 each having a reflective mirror 29 carried on a mirror back 30 which is adjustably secured to the mirror housing 24 by means of spring loaded ball joints 31 in accordance with conventional mounting procedures.

The angles of the two mirrors 29 are asymmetrical, being differently required because of the usual vehicle having a driver's station on one side of the vehicle and the arrangement herein disclosed can reflect light from both the driving station and the opposite side of the vehicle. This is sometimes useful if a vehicle is backing away from the kerb or a driveway at right angles to a carriageway and it is necessary for a driver to have vision of traffic streams in both directions. The rear face of the mirror complex 20 obviously does not require a mirror, and provision is made for a stop light 32 which can be viewed through a lens 33 (Fig 3) or can also be viewed through angled louvres 34 (Figs 1 and 2) set outwardly from the lens 33. (One, or both mirrors may have portion angled to also reflect light from oncoming traffic if the vehicle is "angle parked").

In order to reduce ingress of moisture, a bellows type seal 35 extends between the base 23 and the mirror housing 24 as shown best in Fig 2.

Reference is now made to the second embodiment which is illustrated in Figs 4A, 4B and 5. As shown in Fig 4A, a retractable mirror complex 40 comprises a base 41 secured to a curved side panel 42 of a vehicle by means of fasteners 43 which pass through resilient spacers 44, corrugated to facilitate length adjustment. On the inner side of the panel 42 there is provided a small electric motor 45 on a motor mounting plate 46 (shown "exploded" for simplicity of drawing) and the motor 45 has a worm 47 on its shaft 48. The worm 47 passes through an aperture 49 in the panel 42.

On the outer surface of the panel 42, the base 41 stands clear of the panel so as to limit damage, and the periphery of the base 42 is provided with a bellows type resilient seal 50 which bears against the outer surface of the panel 42.

A mirror assembly 51 is coupled to the base 41 by means of unequal links, there being a lower link 52 projecting from a worm wheel 53 which is carried on a shaft 54 (Fig 5) journaled in bearings 55, and the lower link has an upstanding end 56 which engages in an aperture in mirror housing 57. The other link 60 is of general U shape having two depending legs 61 and 62 respectively pivotal in an outstanding lug 63 of the base 41 and in a second lug 64 in the mirror housing 57. As in the first embodiment, a spring loaded ball joint 31 joins a mirror back 65 to the mirror housing 57, and the mirror back carries the reflective mirror 66. As shown in full lines in Fig 4A, the mirror housing 57 lies contiguous with the outer face of the base 41 and this avoids the need for a socket which is described below with respect to the third embodiment. The lengths and pivotal locations of the two links 52 and 60 determine the angular position of the mirror 66 when the motor 45 is actuated to extend the mirror rearwardly (to the left as shown in dotted lines in Fig 4A). The motor 45 is of the reversible type which is controlled by a reversing switch so that its degree of extension may be controlled to the optimum position for any one of a number of parking modes of a vehicle. The second embodiment is suitable for viewing oncoming traffic from the side opposite the driving station of a vehicle, but not for viewing in both directions as with the first embodiment.

The third embodiment which is illustrated in Figs 6A through to 10 differs from the second embodiment in two ways, firstly that the extension is achieved by a linear movement and the positioning of the mirror to the correct angle by a

cam and cam track arrangement, in lieu of the unequal link arrangement of the second embodiment. Secondly, in the third embodiment use is made of a socket for housing the mirror when it is retracted, although again use may be made of cam and cam track arrangements to hold the reflective surface adjacent a base plate as in the second embodiment. However, in the third embodiment, a mirror assembly 70 comprises a generally U shaped socket 71 the upper portion of which houses a mirror housing 72 which doubles as a mirror back, carrying on it a mirror 73. With the arrangement, as described below, the need for a conventional ball joint assembly 31 is not present.

The socket 71 contains a division plate 74 which extends for some but not all of its length a short distance above the base of the socket, and terminates at its outer end in a flange 75 which extends across its mouth, and is flanked by two vertically extending flanges at each side as best seen in Fig 8.

Within the space beneath the division plate 74 there is a slidable extension arm 76 of channel section with upturned flanges, the outer end of the extension arm 76 having an upstanding boss 77 which supports a post 78, the post passing through a vertically extending apertured lug 79 of the mirror housing 72, and retaining the mirror housing 72 for free swivelling movement about the vertical axis of the post 78. Between the lower end of the post 78 and the boss 77 there is a dished washer 80, and by loosening a nut 81 on the lower end of the post 78, the post 78 may be tilted to adjust for optimum viewing conditions.

Between the upstanding flanges of the extension arm 76 there is a cam slide 82 which is freely movable, the cam slide 82 however, terminating at its rear end in an upstanding flange 83 spaced a short distance rearwardly of an upstanding V shaped projection 84. The forward end of the cam slide 82 comprises a cam slot 85 which extends from one side to the other. The mirror base 72 has a depending spigot 86 surrounded by a small roller 87 which is guided for movement in the cam slot 85 by its wall as the mirror housing 72 moves between its retractable and extendible positions.

Linear movement of the extension arm 82 is effected by drive means substantially as illustrated in Fig 4A (or some mechanical equivalent thereto) which drives one of two guide pinions 88 each of which is in mesh with the teeth 89 of a flexible rack 90, the movement of which is guided by the interior surface at the curved end of the socket 71. The rack is secured to the inner end



of the extension arm 76. When extension of the arm 76 occurs, it carries with it the cam slide arm 82 until such time as the flange 83 thereof abuts the flange 75 which depends from the outer end of the division plate 74. This is shown in Fig 6B. The V shaped projection 84 however is of a lower height and passes beneath the flange at that stage. This arrests outward movement of the cam plate 82 but not of the extension arm 76 which continues under the control of the operator and terminates when the required position of the mirror base 72 is reached. As the extension arm 76 nears the end of its outward travel, a ramp surface 91 on an upwardly extending protuberance 92 engages the "heel" of the cam slide 82 and lifts it so that the lower end of the flange 75 lies in the recess between flange 83 and projection 84, as shown in Fig 6C. This is a safety device which prevents retraction of the cam slide 82 until the mirror base 72 has again substantially aligned with the extension arm 76.

To avoid excessive load being placed on the spigot 86, the extension arm 76 is provided with outstanding lugs 93 which abut the vertically extending flanges 75 at the end of the division plate 74 before the roller 87 abuts the end of cam slot 85. Fig 10 illustrates the mirror assembly 70 mounted on a rear panel of a panel van type vehicle 94, with the extension arm 76 in its extended position and the mirror base 72 angled in such a way as to reflect the light L1 onto a conventional exterior rear vision mirror 95 in such a way that a driver is aware of the more dangerous stream of oncoming traffic on the opposite side of his vehicle. However, the mirror 73 comprises two components, there being a lower component 96 which reflects light L2 from the tow ball 97 of the vehicle 94 so that coupling to a vehicle to be towed is simplified for the driver.

As illustrated and described, the mirror mounting means (part 78) is carried on the end of the extension arm, but clearly the mounting can be at the location of spigot 86 and the cam at the location of part 78 (the reverse of what is described).

In addition to the illustrated components of the mirror assembly 70, use may be made of a closure means to close the mouth of the socket 71. An adjustment screw 98 can retain the cam slide 82 to the extension arm 76 and adjust the relative movement there between.

In the fourth embodiment of Figs 11 and 12, a vertically extendible rear vision mirror assembly 100 again makes use of the device of the second embodiment, having a base plate 111 against which a mirror housing abuts when retracted, thereby avoiding the need for the equivalent of a socket 71. In

the final embodiment, the mirror assembly 101 is elevated by a worm wheel/nut 102 driven by the worm 103 of an interior mounted motor 104 (as in the second embodiment). The wormwheel/nut threadably engages a thread 105 which extends for most of the stem 106. The stem, however, contains a pair of guide slots 107 which are engaged by guide shoes 108 having respective spigots which can partially rotate in a supporting clevis 109 itself secured to the mirror assembly base plate 111. As the mirror is elevated above the boot lid 110 of a vehicle, the curved portions of the slot 107 engage the shoes 108 and cause a partial rotational movement which can be terminated by simply turning off the motor switch. This partial rotation is illustrated in Fig 12 and continues until such time as the driver attains the optimum view.

The base plate 111 is secured to a side panel 112 of the vehicle below the boot lid 110 by securing fasteners 113, and upon retraction of the mirror assembly 101, as the mirror assembly lowers to about the same level as the base mounting plate 111, a small helical formation in the slots 107 causes the mirror assembly 101 to lie firmly against the base plate 111 in a manner which will inhibit damage to the glass of the mirror.

Although a ball joint between the mirror back and housing is shown in Fig 12, in many instances this is not necessary, particularly where the base plate 111 may have a surface moulded to the side panel shape, thereby avoiding need for spacers between base plate 111 and side panel 112. This is because the height of elevated mirror assembly 101 will be approximately the same as the height of a conventional exterior rearview mirror located externally on the driver side of the vehicle, and thereby be in the line of vision of that mirror regardless of the eye height of the driver. As described herein, use is shown of spacers in the second and third embodiments, and these would usually be required for retrofit assemblies, but not necessarily for original equipment.

If the stem is mounted internally, and projects through an aperture in the vehicle body between the boot lid and side panel, it is possible for the mirror to project through an elongate aperture, and the operation is otherwise described. It is however more desirable that the stem should have an L shaped bar at its upper end, which depends from the aperture and, when retracted, lowers the mirror alongside the outer surface of the side panel, the mirror being on the lower end of the L shaped bar.

The above descriptions have been general but have omitted components which are well known and are commonly used in the art. For example, it is deemed necessary in most instances that some clutching arrangement is required for the drive from the motors to their mirror assemblies, suitable clutching arrangements including bifurcate slots in the worms, discoid type clutches or the like. Similarly, in all instances where electric motors are used, they are of the DC reversible type and are controlled in a conventional manner by reversing switches from within the cabin of the vehicle.

As said above, the first embodiment is arranged in such a way in that it can be mounted on panels which lie in various positions on the vehicle. With necessary changes, the second, third and fourth embodiments can also be so mounted, and for example the fourth embodiment can be arranged to lie in a horizontal and not necessarily in a vertical position. However, such variations will be seen to lie within the invention.

**THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:**

1. A rear view mirror assembly having a base, attachment means co-operable with the base to secure the base with respect to a panel of a motor vehicle near its rear end, a mirror carried by the base,

the configuration of the base, attachment means, and mirror directing the mirror (when secured to said panel) in a transverse direction opposite a driving station of the vehicle, and adjustment means on the base operable to so adjust the mirror position as to reflect light onto a conventional rear vision mirror of said vehicle to be readable by a driver when at the driving station.

2. A rear view mirror assembly according to claim 1 wherein said base comprises a mirror housing having two sides defining a general V-shape in plan, and a mirror at each side, each said adjusting means comprising a ball joint co-operable between a said mirror and the mirror housing,

said base having a upwardly directed tongue with a wall defining an upwardly elongate slot, and carries a bolt which extends through the slot to provide a sliding and pivotal adjustment means between said base and mirror housing,

the configuration of the mirrors and mirror housing being such that when said base is secured to a boot lid of a sedan type vehicle, said mirrors can be adjusted to reflect light from each side of the vehicle, through a rear window light opening, and onto a conventional internal rear vision mirror.

3. A rear view mirror assembly according to claim 2 wherein said mirror housing has a third side which co-operates with said two sides to form a triangular shape in plan,

said third side comprising a rearwardly facing stop light and lens combination.

4. A rear view mirror assembly according to claim 1 wherein said base is plate-like but has an outstanding lug with a vertically extending bearing surface and further comprising fasteners which in use retain said base adjacent the outer surface of a motor vehicle rear side panel on the drivers side,

an electric motor fast with the base, a worm wheel coupled for drive to the electric motor,

a first link extending generally horizontally from the worm wheel and terminating in a vertical portion, a mirror housing having first and second

vertical bearing surfaces, the first bearing surface bearing against the vertical portion of the first link for swivelling movement,

a second link also extending generally horizontally and terminating at one end in a vertical portion engaging in said lug cylindrical bearing surface and terminating at the other end also in a vertical portion bearing against said mirror housing second vertical bearing surface,

the horizontally extending portions of the first and second links being of unequal lengths,

the configuration of the plate-like base and links being such that actuation of the motor in an extending direction causes both rearward and outward movement of said mirror housing away from the base, and in a retraction direction causes reverse direction movement, the periphery of said mirror housing when retracted lying continuous with an outer surface of said base.

5. A rear view mirror assembly according to claim 4 further comprising a motor mounting plate configured to lie on the opposite side of said vehicle side panel from said base plate, and wherein, in use, said side panel has an aperture through which a shaft of said motor extends, there being a worm on the extending end of said shaft.

6. A rear view mirror assembly according to claim 4 further comprising a mirror back supporting said mirror and a ball joint between said mirror back and mirror housing.

7. A rear view mirror assembly according to claim 4 further comprising resilient spacers, said fasteners extending through the resilient spacers with the spacers between said base and said side panel when the mirror assembly is retained to said rear side panel.

8. A rear view mirror assembly according to claim 1 further comprising fasteners which in use retain said base adjacent the outer surface of a motor vehicle rear side panel on the driver's side,

an extension arm carried by the base and guided for rearward extension movement thereby, a cam slide arm carried by the extension arm both for rearward extension therewith and for limited movement with thereto,

a motor coupled for drive to said extension arm,

a cam surface on one of said arms and mounting means on the other said arms, a mirror housing carried by said mounting means for pivotal movement about a vertical axis, a cam surface defining a cam slot in the other

of said arms, cam engaging means on the mirror housing spaced from said vertical axis and engaging said cam surface,

and intergaging abutment surfaces on at least one of said arms and said base limiting extension movement of one of said arms more than the other to thereby effect actuation of the cam engaging means near the end of said extension movement and said pivotal movement of the mirror casing.

9. A rear view mirror assembly according to claim 8 wherein said mounting means comprises a post upstanding from an end of said extension arm, and said cam surface is in said cam slide,

said cam engaging means comprising a spigot depending from said mirror housing.

10. A rear view mirror assembly according to claim 8 wherein said mounting means comprises a post upstanding from an end of said extension arm, and a dished surface between a lower-end of said post and said extension arm providing tilt adjustment means foresaid part.

11. A rear view mirror assembly according to claim 8 wherein said base comprises a plate and said base abutment surface is a surface of a flange at one end of a said plate,

said abutment surface of said cam slide arm is a surface thereof which abuts said base abutment flange near but not at the limit of extension of said extension arm, further extension of which causes relative movement of the cam engaging means and cam slide arm and consequential pivotal mirror movement.

12. A rear view mirror assembly according to claim 8 wherein said base comprises walls defining a socket of size to accommodate said mirror housing when retracted, a division plate within the housing near but not at its base and terminating at an outer end in a down turned flange flanked by a pair of side flanges.

said extension arm being slidable between said division plate and socket base and having outstanding lugs which abut said side flanges to thereby terminate extension movement of the extension arm,

said cam slide being carried by said extension arm and having an upturned flange at its inner end which engages said division plate down turned flange to terminate extension movement,

of said cam slide before said termination of extension movement of the extension arm,

a projection upstanding from the cam slide and spaced outwardly from its said upturned flange,

and an upwardly extant protuberance at the inner end of said extension arm which engages the cam slide and urges it upwardly after said termination of said cam slide extension movement to thereby raise the protuberance to the level of said division plate down turned flange and inhibit retraction of the cam slide during initial retraction movement of said extension arm thereby re-aligning said mirror housing with said extension arm re-entry into said socket.

13. A rear view mirror assembly according to claim 1 further comprising fasteners which in use retain said base adjacent a motor vehicle rear side panel on the driver's side, a motor fast with said base and having a worm on its shaft,

a worm wheel engaged by said worm for drive, and having a central female thread,

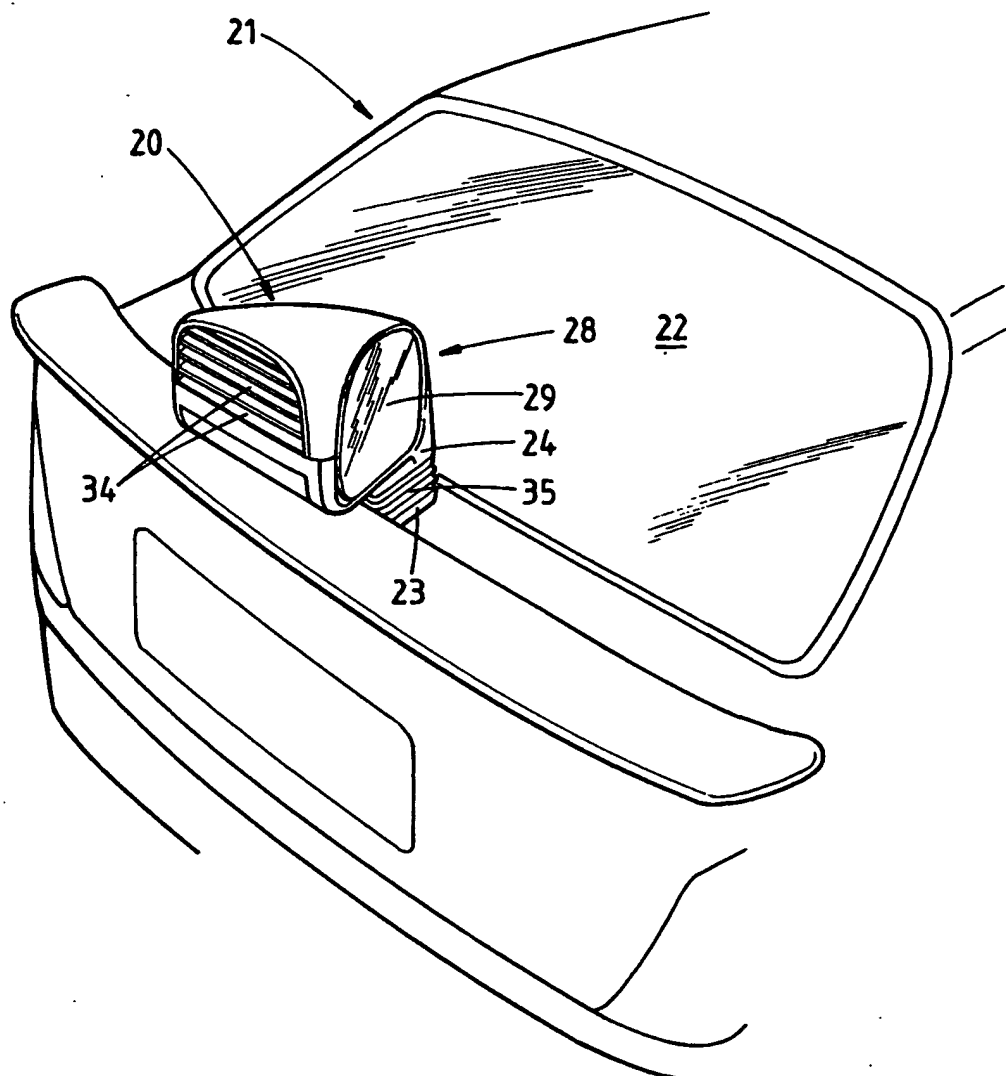
a vertically extending stem having a male thread engaged by the female thread, and also having slot walls defining an axially extending slot which is part helical at one end,

a shoe on the base having surfaces engaging the slot walls, and a mirror housing and mirror assembly carried on an upper end of said stem,

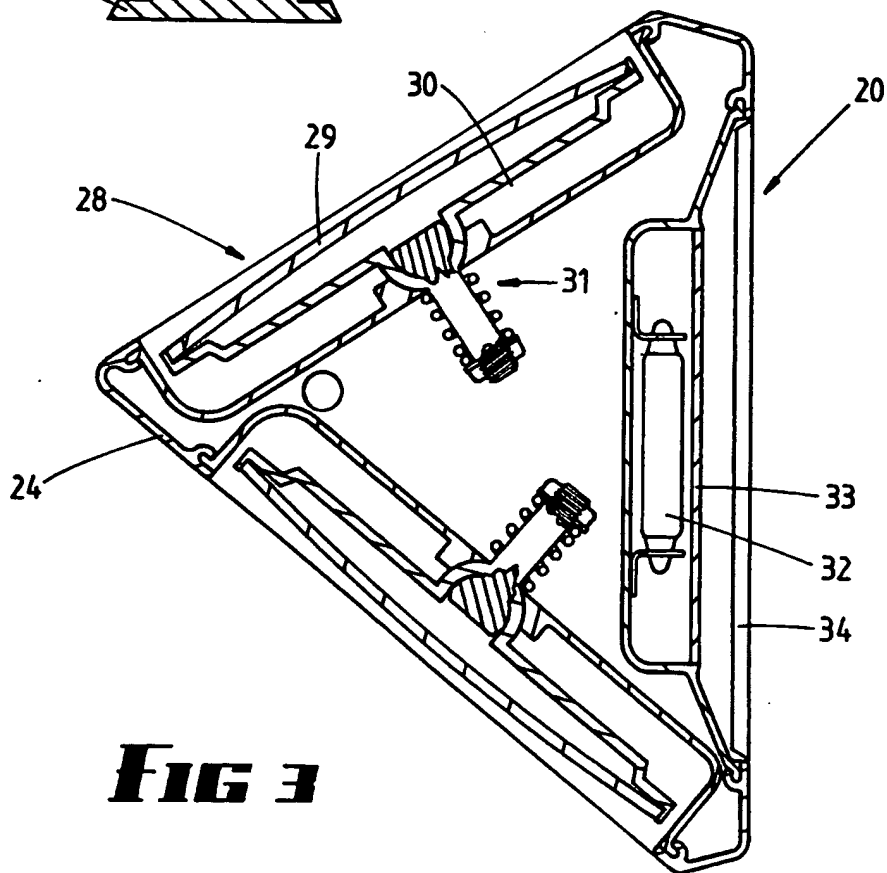
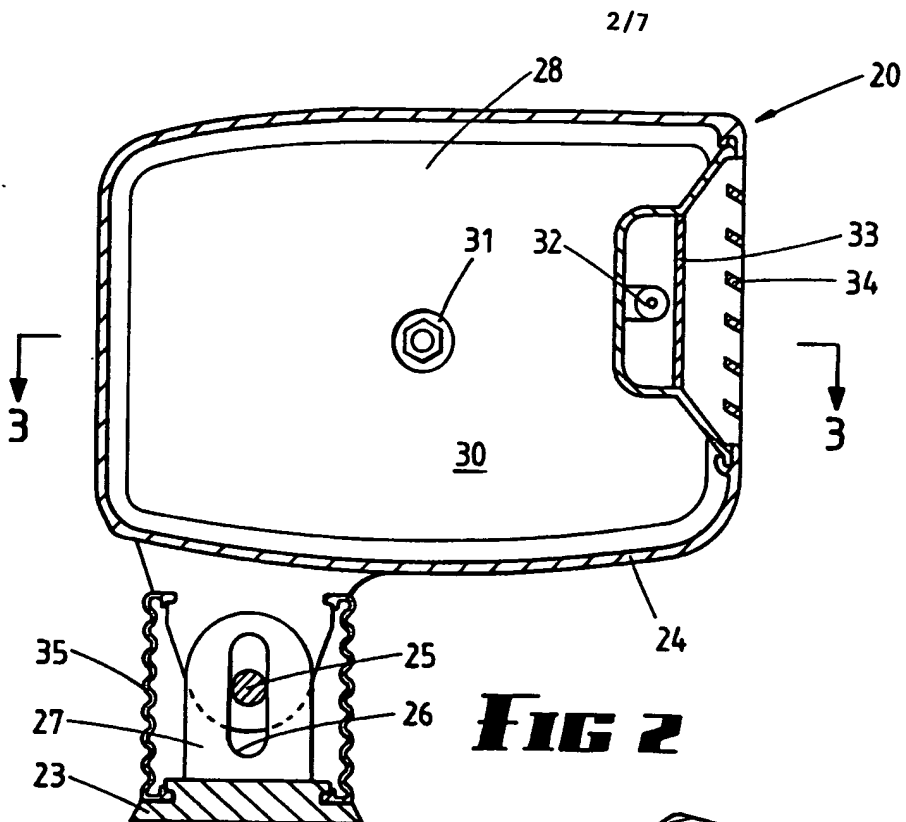
the configuration being such that motor operation can effect elevation of said mirror, and partial rotation thereof upon said part helical slot portion engaging said shoe.

14. A rear view mirror assembly according to claim 13 wherein there are two said slots opposite each other and two said shoes, and further comprising a supporting clevis fast with said base, said clevis having a pair of apertures having circular walls and said shoes having respective spigots which can partially rotate in said apertures.

1/7

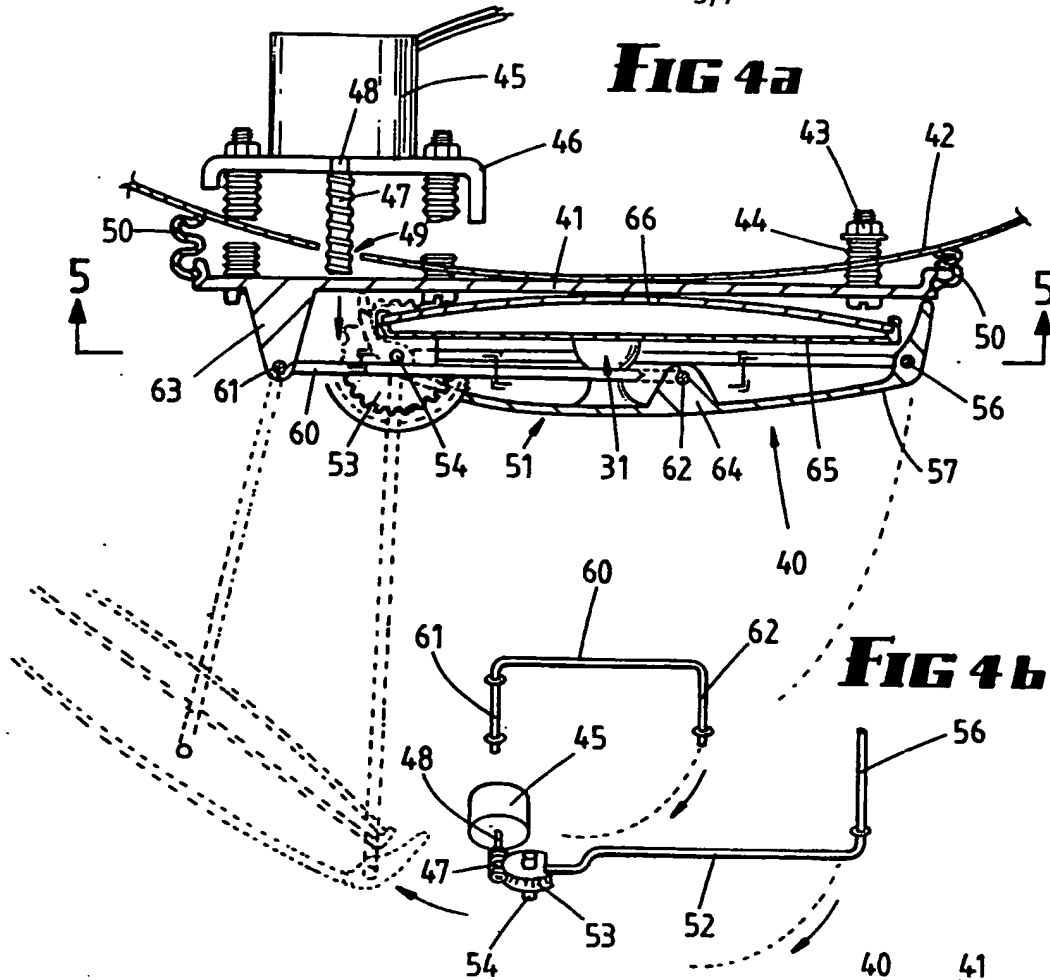
**FIG 1**



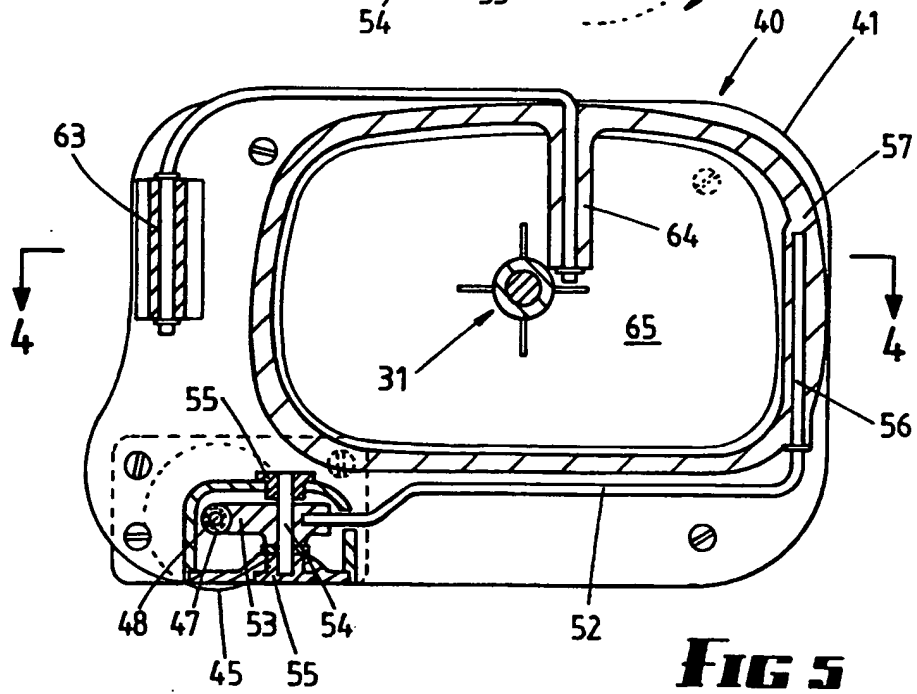
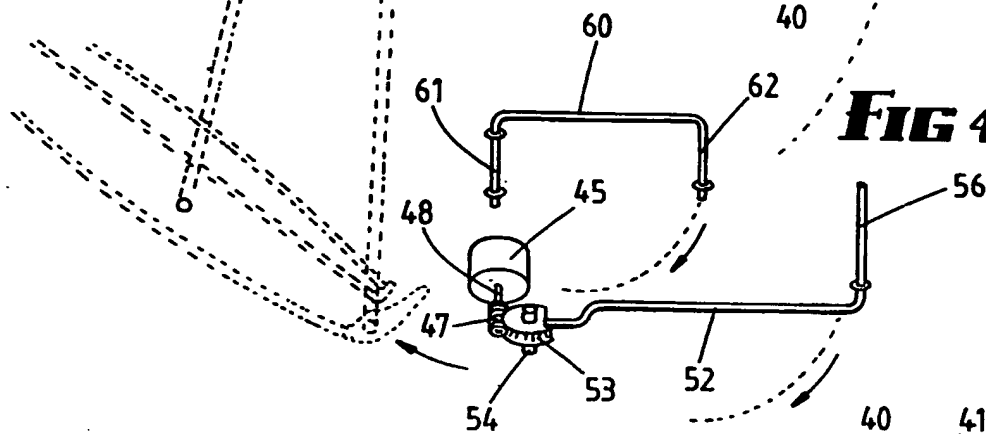


3/7

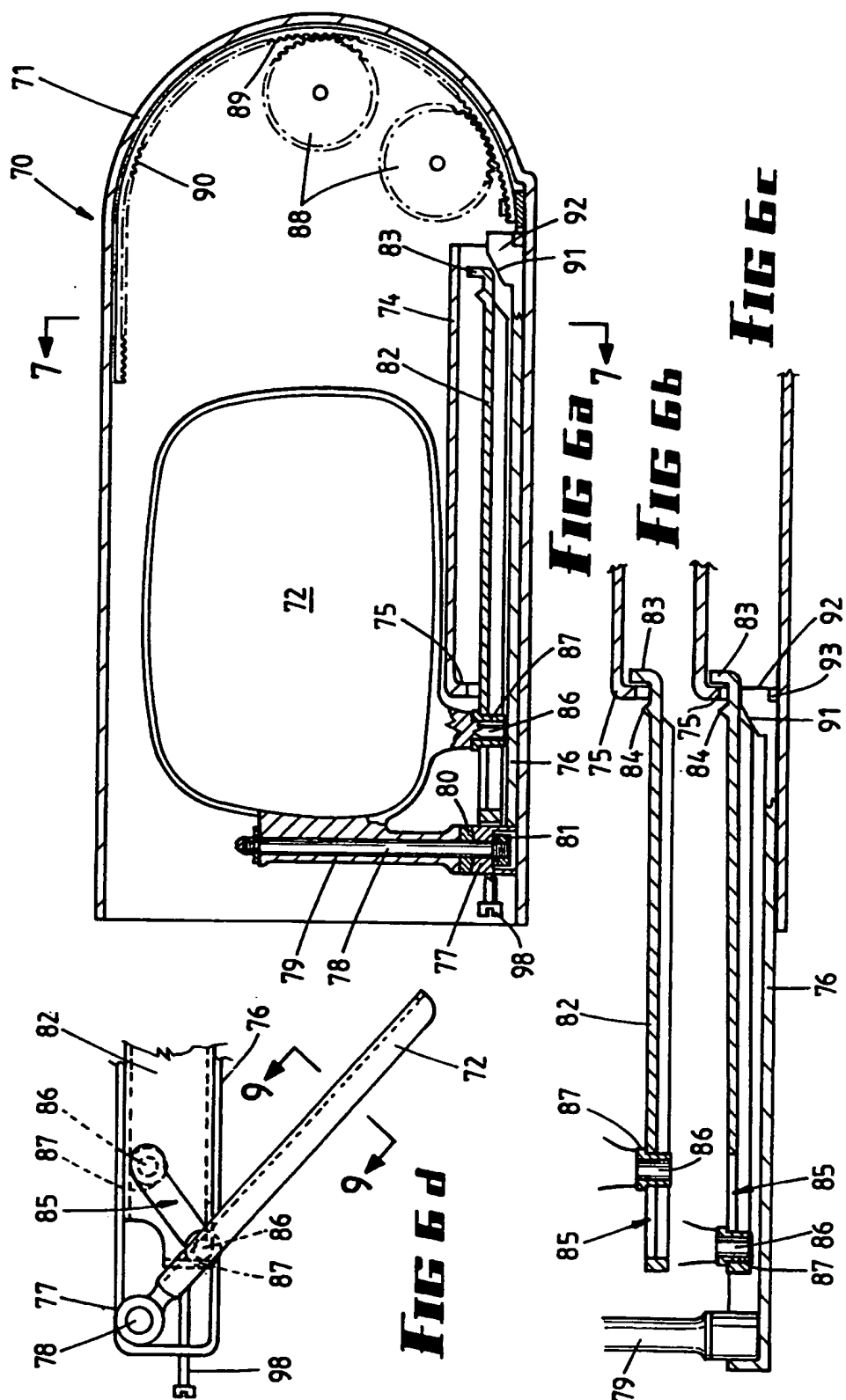
**FIG 4a**



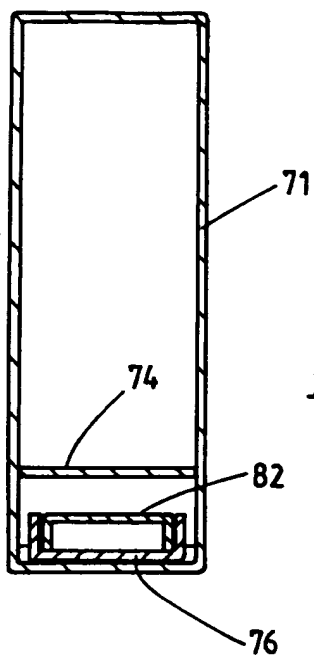
**FIG 4b**



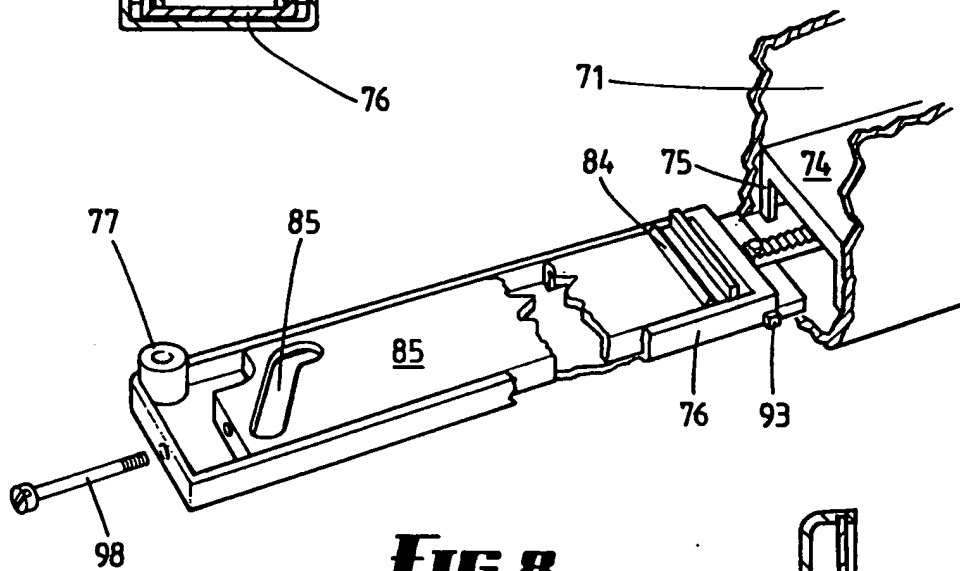
**FIG 5**



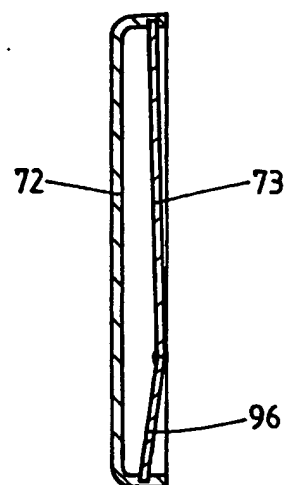
5/7



**FIG 7**

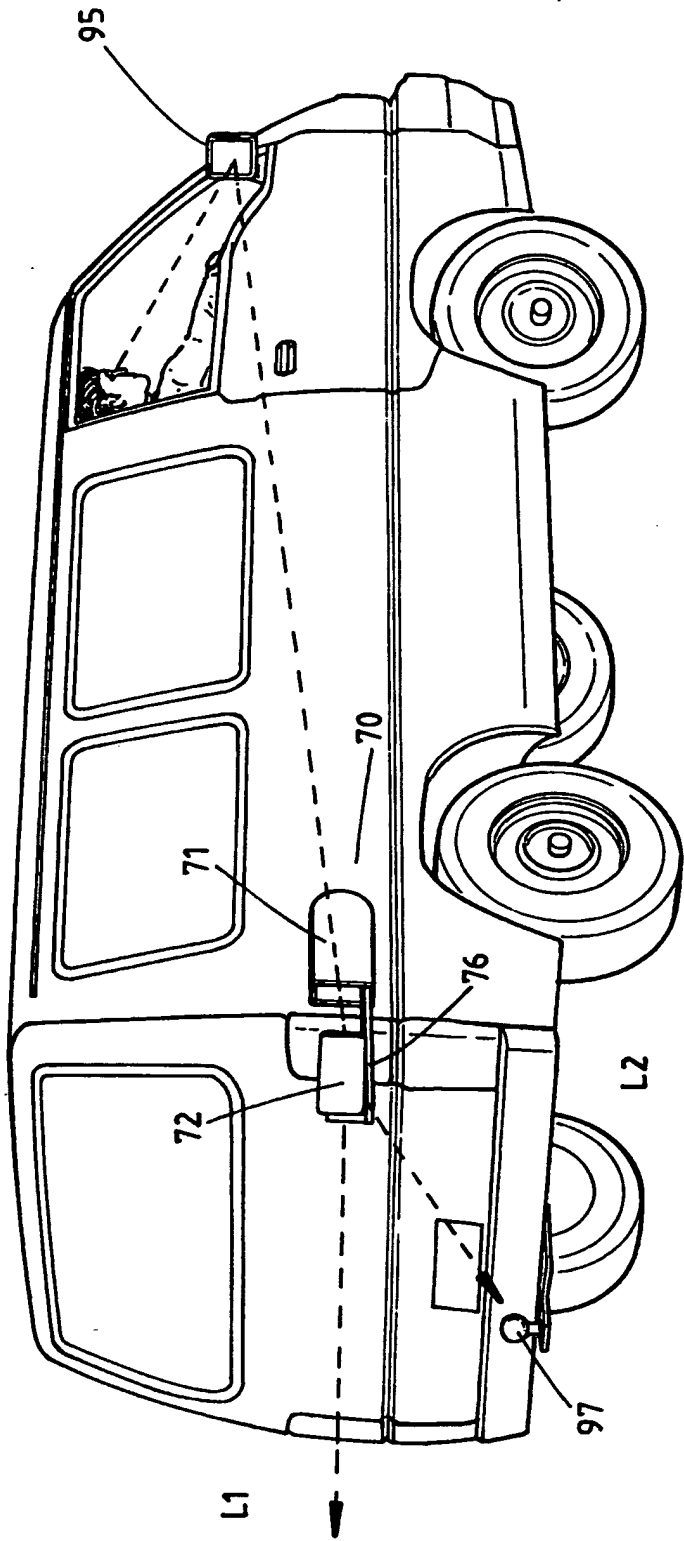


**FIG 8**

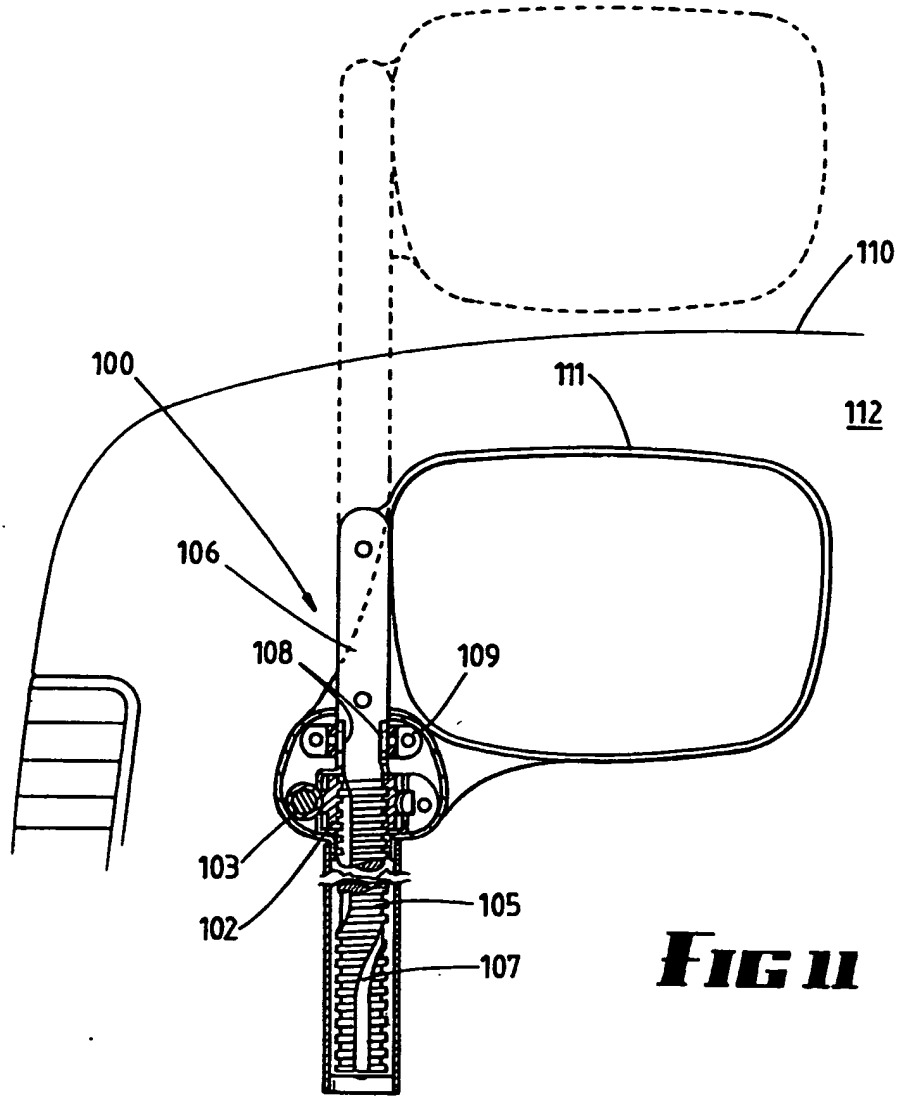
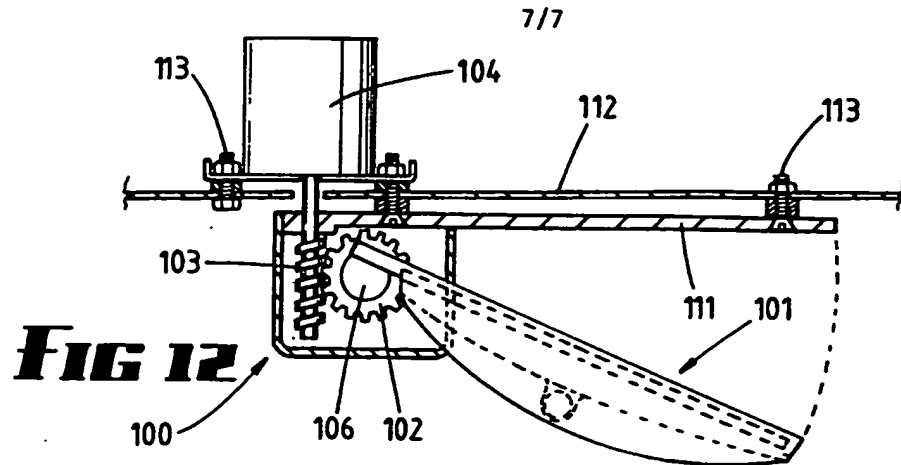


**FIG 9**

6/7



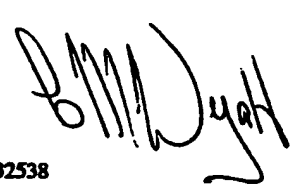
**FIG 10**



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU 93/00269

|  |  |  |  |  |
|--|--|--|--|--|
| <b>A. CLASSIFICATION OF SUBJECT MATTER</b><br>Int. Cl. <sup>5</sup> B60R 1/08, 1/12, 1/06<br><br>According to International Patent Classification (IPC) or to both national classification and IPC   |  |  |  |  |
| <b>B. FIELDS SEARCHED</b><br><br>Minimum documentation searched (classification system followed by classification symbols)<br>IPC B60R 1/08, 1/12, 1/06<br><br>Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched<br>AU : IPC as above<br><br>Electronic data base consulted during the international search (name of data base, and where practicable, search terms used)<br>DERWENT   |  |  |  |  |
| <b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>  |  |  |  |  |
| <b>Category *</b>  | <b>Citation of document, with indication, where appropriate, of the relevant passages</b>  | <b>Relevant to Claim No.</b>   |  |  |
| X<br>Y   | AU,A,46154/64 (LORENZO) 6 January 1966 (06.01.66)<br>page 2, line 1 to page 3, line 25 and Figures 1, 2 and 8  | 1<br>2-3   |  |  |
| X<br>Y   | GB,A,2177361 (PHILLIPS) 21 January 1987 (21.01.87)<br>abstract and Figures 1 and 4   | 1<br>2-3   |  |  |
| X<br>Y   | GB,A,2186535 (YANG) 19 August 1987 (19.08.87)<br>abstract and Figures 2 to 6   | 1<br>2-3   |  |  |
| <div style="display: flex; justify-content: space-between;"> <div> <input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C.         </div> <div> <input checked="" type="checkbox"/> See patent family annex.         </div> </div>  |  |  |  |  |
| <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <b>* Special categories of cited documents :</b><br/> <b>"A"</b> document defining the general state of the art which is not considered to be of particular relevance<br/> <b>"E"</b> earlier document but published on or after the international filing date<br/> <b>"L"</b> document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)<br/> <b>"O"</b> document referring to an oral disclosure, use, exhibition or other means<br/> <b>"P"</b> document published prior to the international filing date but later than the priority date claimed             </td> <td style="width: 50%; vertical-align: top;"> <b>"T"</b> later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention<br/> <b>"X"</b> document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone<br/> <b>"Y"</b> document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art<br/> <b>"&amp;"</b> document member of the same patent family             </td> </tr> </table> |  |  | <b>* Special categories of cited documents :</b><br><b>"A"</b> document defining the general state of the art which is not considered to be of particular relevance<br><b>"E"</b> earlier document but published on or after the international filing date<br><b>"L"</b> document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)<br><b>"O"</b> document referring to an oral disclosure, use, exhibition or other means<br><b>"P"</b> document published prior to the international filing date but later than the priority date claimed | <b>"T"</b> later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention<br><b>"X"</b> document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone<br><b>"Y"</b> document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art<br><b>"&amp;"</b> document member of the same patent family |
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| Date of the actual completion of the international search<br>17 August 1993 (17.08.93)   |  | Date of mailing of the international search report<br>31 AUG 1993 (31.08.93)   |  |  |
| Name and mailing address of the ISA/AU<br><br>AUSTRALIAN INDUSTRIAL PROPERTY ORGANISATION<br>PO BOX 200<br>WODEN ACT 2606<br>AUSTRALIA<br><br>Facsimile No. 06 2853929   |  | Authorized officer<br><br><div style="text-align: center;"> <br/> <b>C.M. WYATT</b><br/>         Telephone No. (06) 2832538       </div> |  |  |

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU 93/00269

| Category* | Citation of document, with indication, where appropriate of the relevant passages                            | Relevant to Claim No. |
|-----------|--|-----------------------|
| X         | PATENT ABSTRACTS OF JAPAN, M435, page 57, JP,A,60-143156 (NISHINO)<br>29 July 1985 (29.07.85)<br>abstract    | 1                     |
| X         | WO,A,90/12705 (WADE) 1 November 1990 (01.11.90)<br>abstract and Figures 1 to 3                               | 1                     |
| X<br>A    | GB,A,2085382 (BRIERLEY) 28 April 1982 (28.04.82)<br>abstract and Figures 1 to 3                              | 1<br>9, 11            |
| X<br>A    | PATENT ABSTRACTS OF JAPAN, M76, page 1814, JP,A,51-137237 (OKUDA)<br>27 November 1976 (27.11.76)<br>abstract | 1<br>8                |
| X<br>A    | PATENT ABSTRACTS OF JAPAN, M1044, page 9, JP,A,2-208144<br>(OKAMURA) 17 August 1990 (17.08.90)<br>abstract   | 1<br>8                |
| X<br>A    | DE,C,3718125 (AUDI AG) 11 August 1988 (11.08.88)<br>abstract and Figures 1 and 2                             | 1<br>4                |



**Information on patent family members**

**PCT/AU 93/00269**

**This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.**

| Patent Document<br>Cited in Search<br>Report |         | Patent Family Member |        |
|--|---------|----------------------|--------|
| GB   | 2186535 | EP                   | 235993 |
| GB   | 2085382 | HK                   | 289/86 |
|  |         |                      |        |
| <b>END OF ANNEX</b>                          |         |                      |        |